



ALCO'S all-purpose locomotive is hauling a freight train during a recent "on-line" demonstration

## High-Capacity All-Service Diesel

American Locomotive six-wheel truck design powered by improved 2,250-hp. engine has a short-time rating of 107,400 lb. and, for passenger service, a 65,100-lb. rating at a speed of 80 m.p.h.

**A** high-output diesel-electric locomotive, designed for flexibility in handling all types of rail service, has been introduced by the American Locomotive Company. Model DL-600, the latest addition to Alco's diesel line is a six-motor unit rated at 2,250 hp. A hood-type unit, the DL-600 differs in outward appearance from Alco-built road switchers since its front and rear hoods are the same height as its cab.

The DL-600 has been designed to operate with the short nose forward to provide maximum visibility. Another distinction is the recess found in each of the four corners of the hood, which contains the 45-degree number boards, classification lights and sand box covers. Hand rails enclose the entire running board area, and the vestibule-type steps are designed so that a brakeman can either use them or the locomotive's footboards.

This new heavy-duty all-purpose locomotive is a versatile unit built not only for high-speed, main-line freight or passenger assignments but also for slow-speed, heavy drag service. It is equally at home on medium speed local freight runs or yard transfer and switching assignments.

Power for the DL-600 is furnished by the improved Alco Model 244 V-type diesel engine. The 16-cylinder engine is rated at 2,250 hp. A new feature is the water-cooled turbosupercharging system which is designed to provide lower maintenance cost and more rugged construction than air-cooled superchargers formerly used with this engine. The new turbo offers improved acceleration characteristics due to its smaller diameter impeller, is relatively quiet in operation, and assures better engine combustion.

The locomotive is equipped with two three-motor, three-axle trucks of the drop-equalizer, modified swivel type designed for ease of maintenance, equal weight distribution and smooth riding at high speeds.

For passenger service, the unit can be equipped with a steam generator of up to 4,500 pounds per hour capacity. Water capacity is 2,000 gallons.

Liquid capacity is provided on the underframe between the trucks which eliminates the danger of weight transfer and provides for simple maintenance. Fuel capacity of 1,350 gallons insures long operating periods without refueling, and, if a steam generator is

not required, a single fuel tank of 2,400 gallons capacity can be installed.

The new locomotive is available with 3,400 dynamic-brake horsepower at 20 m.p.h., said to be the highest level yet offered on rail motive power, and fully automatic braking control can be added as a modification. Maximum dynamic braking forces range from 62,800 lb. with 65-m.p.h. gearing to 51,500 lb. with 80-m.p.h. gearing. The rear hood has been raised to permit application of the high-capacity dynamic braking over the engine.

### **Improved Electrical Equipment**

Another feature of the DL-600 is the improved main generator, Model GT 536, which offers increased current capacity enabling traction motors to take full advantage of engine horsepower at all speeds. Short-time tractive ratings can be reached which allow the development of tractive force up to values corresponding to 30 per cent adhesion.

The unit is equipped with General Electric Type GE-752 traction motors, the same motors which are used on all Alco road locomotives. Traction-motor connections are designed to give maximum utilization of the diesel engine over the entire speed range of the locomotive. They are two series, three parallel and six parallel, both with full and reduced field strength. Automatic transition is furnished.

Main generator excitation current is supplied by a three-phase alternator and rectifier. The alternator feeds current into the rectifier for d.c. excitation. The system is designed for simplified maintenance, as the one a.c. generator replaces three rotating electrical machines.

Control circuits have been simplified by reducing the number of relays in the system, and the relays used are a new type designed to give longer life under service conditions. Both changes reduce control system maintenance.

The main generator is direct current and contains both main and starting windings. It is mounted directly at the end of the diesel engine, requiring only one generator armature bearing. The excitation alternator is mounted on the main generator, as is the auxiliary generator which supplies power for lighting, battery charging and control circuits. The auxiliary generator operates at constant voltage which is controlled by a voltage regulator. Both alternator and auxiliary are driven by gears connected to the main generator.

Air for traction-motor cooling is supplied by two multivane traction-motor blowers, each of which supplies air for the motors of one truck. The front blower is gear-driven off the main generator, while the rear blower is belt-driven from the shaft between the air compressor and the radiator fan.

### **Smooth Riding Trucks**

Arrangement of long equalizers and deep-deflection springs contributes to smooth riding at speeds up to 80 m.p.h. The spring system of the truck consists of four groups of two helical springs each, located near each end pedestal. The truck frame is supported on these springs which in turn are carried on four sets of double, drop-center equalizers extending from the end axles to the center axle. Desired axle loadings are attained by proper



**ELECTRICIANS** installing the control stand and contactor compartment in the DL-600.

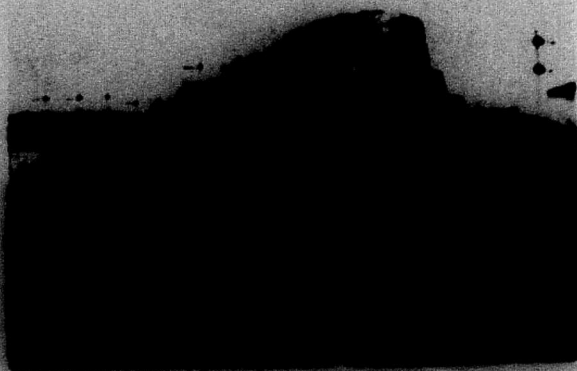


**COMPLETED SUPERSTRUCTURE** being lowered onto the trucks in erecting shop in Schenectady.



**THE UNDERFRAME** and attached parts, as shown here, are assembled as a unit.





THE DL-600 pulling a passenger train into a terminal during one of its demonstration runs.

positioning of springs along the spans of the equalizers and proper proportioning of the springs. Mechanical-type snubbers are applied in one spring of each group.

The center plate of the truck is located on a cross transom between two motors. The oil-lubricated loading-pad bearing surfaces are located similarly on the other transom at the opposite end of the truck. By placing the load-carrying members between the motors, advantage is taken of the deep transom sections for carrying the load to the side frames.

Clasp-type brakes are used on all wheels.

The underframe of the DL-600 is a steel weldment, and the superstructure is of welded steel plate. The rear hood encloses the engine, generator, dynamic brakes and other apparatus, while the front hood provides space for steam generating equipment. The section over the engine and generators is removable and the radiators are located at the back of that hood.

The cab is of welded steel with controls and engine-man's seat on the right facing the front, and a second seat on the left side of the cab. Doors are located in the right side of the rear wall and the left side of the front wall, as well as in the front cab wall for access to the steam generator compartment.

### Operating Controls

The cab is designed for the comfort and safety of the operating crew, with emphasis on roominess, visibility and low noise level. A new, low control stand has been installed to facilitate crew communication. The stand, at the left of the operator's seat, contains throttle, selector handle, reverser handle and circuit-breaker-type switches for generator field and fuel transfer pump. Control circuits, headlight switches, light switches, wheel-slip indicating lamp, and the ground relay are also found on the control stand.

Air-brake gauges, speedometer and load meter are placed directly in front of the engineman, and signal lights for low oil pressure, hot engine water and all other instruments are situated on the bulkhead for observation from normal crew operating positions. Two large fresh-air induction hot-water core-type heaters, which assure

ample heating capacity for any weather, are supplied. Windshield defrosters use air inducted from the cab heaters.

### Braking System

The brake valve is located in front of the engineman so that he can operate it while facing forward. The air brakes are Schedule 24RL. Air is supplied by the two-stage, three-cycle compressor driven directly by the main engine. The displacement at idling speed (400 r.p.m.) is 122 cu. ft. per min., and at full engine speed (1,000 r.p.m.) is 306 cu. ft. per min. Two main reservoirs below the underframe have a total capacity of 60,900 cu. in.

Clean air for the dynamic braking system is provided through car-body filters located above the engine compartment doors in the sides of the hood. Air flow through the car-body filters also provides a continuous medium for removing heat from the compressed-air system. Air pipes are run between the air compressor and first main reservoir in parallel across car-body filters on both sides of the hood.

Automatic sanding and wheel-slip control equipment is also installed to give maximum control under all wheel slippage conditions.

The locomotive is powered by the improved Alco Model 244 engine having 16 cylinders of 9-in. bore and 10½-in. stroke and a full-load speed of 1,000 r.p.m. Engine starting is effected by using the main generator as a motor, with current supplied by storage batteries.

A gear-driven centrifugal pump circulates water through engine, radiators and lubricating oil cooler. Radiator inflow is controlled by a simplified modulated shutter control and by the variable speed of the 72-in. radiator fan, which is driven through an eddy-current clutch for speed control. Engine intake air is ducted from car-body filters direct to the water-cooled turbo-charger air intake. The capacity of the cooling system is such as to keep the oil and water temperatures down to conservative figures even at high ambient temperatures.

The DL-600 can be obtained in weights ranging from 325,000 lb. on driving wheels, where light axle loading is an advantage, up to 390,000 lb., where heavy axle loadings and corresponding greater tractive force can be utilized.

The DL-600 has continuous tractive-force ratings corresponding to the gear ratios as follows:

Maximum Speed	Gear Ratio	Continuous Tractive Force
80 m.p.h.	64-19	65,100 lb.
75 m.p.h.	65-18	69,800 lb.
65 m.p.h.	74-18	79,500 lb.

The flexibility of the DL-600 can be noted from the continuous tractive-force ratings shown above. The 360,000-lb. unit geared for 80-m.p.h. maximum speeds provides continuous tractive force equivalent to 13 per cent adhesion. Thus, heavy freight drags can be handled by a unit also capable of 80-m.p.h. performance in passenger service.

Where the heaviest freight movements are involved, the 390,000-lb. unit with 65-m.p.h. gearing offers the highest continuous tractive force available and may still operate in high-speed freight or passenger service.